CLAIMS

I claim:

1. A method comprising:

forming a dielectric layer comprising a matrix material with a plurality of pores and porogen material within the pores; and

removing at least some of the porogen material from at least some of the plurality of pores.

2. The method of claim 1 wherein removing at least some of the porogen material comprises thermally decomposing at least some of the porogen material.

3. The method of claim 2 further comprising depositing a thin film at a deposition temperature.

4. The method of claim 3 wherein the porogen material has a thermal decomposition temperature higher than the deposition temperature.

5. The method of claim 4 wherein the deposition temperature is about 300 degrees Celsius or lower.

6. The method of claim 2 wherein the porogen material has a thermal decomposition temperature lower than a thermal decomposition temperature of the matrix material.

7. The method of claim 6 wherein the porogen material has a thermal decomposition temperature higher than 300 degrees Celsius.

8. The method of claim 6 wherein the porogen material comprises at least one of polyethylene terephthalate, polyamide-6,6, syndiotactic polystyrene, polycaprolactone, polypropylene oxide, polycarbonate, polyphenylene sulfide, polyamideimide, polyphthalamide, polymethylstyrene, polyethretherketone, polyether sulfone, polyetherketone, polyoxymethlene, polybutylene terephthalate, and polystyrene.

9. A device comprising:

a substrate layer; and

a first dielectric layer connected to the substrate layer, the first dielectric layer comprising a matrix material with a plurality of pores and porogen material within the pores.

10. The device of claim 9 wherein the porogen material comprises at least one of polyethylene terephthalate, polyamide-6,6, syndiotactic polystyrene, polycaprolactone, polypropylene oxide, polycarbonate, polyphenylene sulfide, polyamideimide, polyphthalamide, polymethylstyrene, polyethretherketone, polyether sulfone, polyetherketone, polyoxymethlene, polybutylene terephthalate, and polystyrene.

11. The device of claim 9 wherein the plurality of pores in the matrix material define an aggregate void volume representing at least 80% of the volume of the dielectric layer.

12. The device of claim 9 wherein the porogen material has a thermal decomposition temperature lower than a thermal decomposition temperature of the matrix material.

13. The device of claim 9 wherein the porogen material has a thermal decomposition temperature lower than about 440 degrees Celsius.

14. The device of claim 9 further comprising a second dielectric layer having substantially less porosity than the first dielectric layer.

15. The device of claim 14 wherein the second dielectric layer is located between the substrate and the first dielectric layer.

16. A method comprising:

forming a dielectric layer comprising a matrix material with a plurality of pores and porogen material within the pores;

forming a trench in the dielectric layer;

filling the trench with a conductive material, the filling being performed at a filling temperature; and

removing at least some of the porogen material from at least some of the plurality of pores.

17. The method of claim 16 wherein the porogen material has a thermal decomposition temperature higher than the filling temperature and lower than a thermal decomposition temperature of the matrix material.

18. The method of claim 17 wherein the porogen material comprises at least one of polyethylene terephthalate, polyamide-6,6, syndiotactic polystyrene, polycaprolactone, polypropylene oxide, polycarbonate, polyphenylene sulfide, polyamideimide, polyphthalamide, polymethylstyrene, polyethretherketone, polyether sulfone, polyetherketone, polyoxymethlene, polybutylene terephthalate, and polystyrene.

19. The method of claim 18 wherein the matrix material comprises at least one of cross-linked polyphenylene, polyaryl ether, polystyrene, crosslinked polyarylene, polymethylmethacrylate, aromatic polycarbonate, aromatic polyimide, methyl silsesquioxane, and hydrogen silsesquioxane.